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### REMARKS

In view of the following discussion, the Applicants believe that all claims are in allowable form.

### CLAIM REJECTIONS

#### **I. 35 U.S.C. §103(a) Claims 1, 6, 8 and 9**

Claims 1, 6, 8, and 9 stand rejected as being unpatentable over International Patent Application WO 99/20811, published Apr. 29, 1999, by Bang et al. (hereinafter *Bang*), in view of Japanese Patent Publication 2000-252218 by Okamoto et al. (hereinafter *Okamoto*), United States Patent Serial No. 5,422,139, issued Jun. 6, 1995 to Fischer (hereinafter *Fischer*), and United States Patent Serial No. 6,077,384, issued Jun. 20, 2000 to Collins et al. (hereinafter *Collins*). In response, the Applicants have amended claim 1 to more clearly recite aspects of the invention.

Claim 1, as amended, recites limitations not taught or suggested by any permissible combination the cited references. *Bang* teaches and suggests gas distribution plates 72 and 88 coupled to a lid 20 disposed in a spaced apart relationship and respectively containing apertures 75, 90. (*Bang*, Figs. 2-3 and accompanying text.) The lid 20 is made of a process-compatible material such as aluminum or anodized aluminum. (*Bang*, p. 4 Detailed Description.) *Bang* does not teach a roof fabricated from a silicon-based material, a gas distribution plate disposed within a recess in the roof and having a first side facing the roof and a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 1.

*Okamoto* teaches and suggests a hollow electrode 5 having grooves 8 and a plurality of gas blow-out holes 7. (*Okamoto*, Abstract and Fig. 3.) However, as can be seen from Figure 4, *Okamoto* does not teach or suggest a plurality of apertures disposed within the grooves, as recited in claim 1. Furthermore, the grooves 8 are facing the inside of the reaction container 1, as opposed to facing the roof, and operate to channel exhaust gas laterally from the reaction zone of the container 1 to prevent

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change in the composition ratio of the gas from accumulating between the electrode 5 (gas distribution plate) and the substrate 10. (*Okamoto*, ¶ [0033]-[0036]) In other words, *Okamoto* is concerned with exhausting gas from within the chamber to prevent a change in composition ratio of the gas due to the plasma. As such, there is no suggestion from within either *Bang* or *Okamoto* to combine the grooves of *Okamoto* with the gas distribution plates of *Bang* to more uniformly introduce the gas into the chamber because the grooves of *Okamoto* are not used for delivering gas to the processing chamber. Moreover, any combination of *Bang* and *Okamoto* will not result in a gas distribution plate having a first side that faces the roof and a plurality of blind radial grooves formed in the first side of the gas distribution plate.

*Fischer* teaches and suggests a gas distribution plate with concentric, radially connected circular grooves 39 disposed in a plate 37. The plate 37 has bores 5a formed through the plate in the areas not occupied by the grooves 39. An outer plate 35 has a plurality of openings 3 which align with the grooves 39 and a plurality of draw off openings 5 aligned with bores 5a. (*Fischer*, col. 9, l. 60 to col. 10, l. 22.) The objective of *Fischer* is to maximize fresh process gases in the process chamber by providing localized exhaust of the process gases from the chamber through the draw off openings 5 and 5a. (*Fischer*, col. 3, l. 17 to col. 5, l. 42.) As discussed above, *Okamoto* is also concerned with exhausting gas from within the chamber to prevent a change in composition ratio of the gas due to the plasma. As *Fischer* and *Okamoto* both provide for localized gas exhaust of process gases from the chamber, they may be combined to configure a structure for exhausting gas from a reaction zone. However, the teachings of *Okamoto* and *Fischer* for configuring an exhaust does not teach or suggest a modification to the gas delivery apparatus of *Bang* that would yield the claimed subject matter.

*Collins* discloses a disc-shaped ceiling 110 made from silicon carbide. However, since the structure of *Bang*, *Okamoto*, and *Fischer* fails to teach or suggest the claimed subject matter of claim 1 even if they are made of silicon carbide, any permissible combination of *Bang*, *Okamoto*, and *Fischer* with *Collins* fails to yield the claimed invention, i.e., a gas distribution plate disposed within a recess in the roof and having a

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first side facing the roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 1. Therefore, the Examiner has failed to create a *prima facie* case of obviousness because the combination of the cited references fails to teach or suggest all of the claimed limitations.

Thus, independent claim 1, and all claims depending therefrom, are patentable over *Bang* in view of *Okamoto*, *Fischer*, and *Collins*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

II. 35 U.S.C. §103(a) Claims 7, 10-13, 16-19 and 21-26

A. Claims 7, 10-13, 16-17 and 26

Claims 7, 10-13, 16-17 and 26 stand rejected as being unpatentable over *Bang* in view of *Okamoto*, *Fischer*, and *Collins*, and further in view of United States Patent Serial No. 6,129,808, issued October 10, 2000 to Wicker et al. (hereinafter *Wicker*), and United States Patent Serial No. 5,910,221, issued June 8, 1999 to Wu (hereinafter *Wu*). In response, the Applicants have amended claim 1 to more clearly recite aspects of the invention.

As discussed in section I., above, the teachings of *Bang*, *Okamoto*, *Fischer*, and *Collins* cannot be combined in a manner that recites all of the limitations of Claim 1. *Wicker* discloses a plasma etch chamber having a gas distribution plate made of silicon carbide. However, *Wicker* does not teach or suggest a gas distribution plate disposed within a recess in the roof and having a first side facing the roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 1.

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*Wu* discloses a plasma reactor having bonded silicon carbide parts. However, *Wu* does not teach or suggest a gas distribution plate having a first side facing a roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 1.

As such, *Wicker* and *Wu* cannot be used to modify *Bang*, *Okamoto*, *Fischer*, and *Collins* to teach or suggest a gas distribution plate having a first side facing a roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 1. Therefore, the Examiner has failed to create a *prima facie* case of obviousness because the combination of the cited references fails to teach or suggest all of the claimed limitations.

Thus, independent claim 1, and all claims depending therefrom, are patentable over *Bang* in view of *Okamoto*, *Fischer*, and *Collins*, and further in view of *Wicker* and *Wu*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

B. Claims 18, 19 and 21-25

Claims 18, 19 and 21-25 stand rejected as being unpatentable over *Bang* in view of *Okamoto*, *Fischer*, and *Collins*, and further in view of *Wicker* and *Wu*. In response, the Applicants have amended claim 18 to more clearly recite aspects of the invention.

Independent claim 18, as amended, recites limitations not taught or suggested by any permissible combination of the cited references. Claim 18 recites, in relevant part, a gas distribution plate disposed in a recess in a roof and having a first side facing the roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate. As discussed in section II. A., above, *Wicker* and *Wu* cannot be used

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to modify *Bang*, *Okamoto*, *Fischer*, and *Collins* to teach or suggest a gas distribution plate having a first side facing a roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 18. Therefore, the Examiner has failed to create a *prima facie* case of obviousness because the combination of the cited references fails to teach or suggest all of the claimed limitations.

Thus, independent claim 18, and all claims depending therefrom, are patentable over *Bang* in view of *Okamoto*, *Fischer*, and *Collins*, and further in view of *Wicker* and *Wu*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

**III. 35 U.S.C. §103(a) Claims 1, 6, 8 and 9**

Claims 1, 6, 8, and 9 stand rejected as being unpatentable over European Patent Application EP 0814495, published December 29, 1997, by Shan et al. (hereinafter *Shan*), in view of *Okamoto*, *Fischer*, and *Collins*. In response, the Applicants have amended claim 1 to more clearly recite aspects of the invention.

Claim 1, as amended, recites limitations not taught or suggested by any permissible combination the cited references. *Shan* teaches and suggests a plasma chamber having a gas distribution plate 44 coupled to a lid 24. One or more gas lines connect to fittings in the chamber lid 24 and deliver process gases to an inlet manifold area above the gas distribution plate 44. The process gases then flow through the gas distribution plate into the interior of the chamber. (*Shan*, Figs. 1 and 3, p. 4, ll. 22-27) However, *Shan* does not teach a gas distribution plate having a first side facing a roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 1.

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*Okamoto*, *Fischer*, and *Collins* are discussed above. For the same reasons as discussed in Section I., there is no motivation to incorporate either of the exhaust structures of *Okamoto* or *Fischer* with the gas delivery structure of *Shan* in a manner that flows incoming process gas through grooves then through holes in the grooves before entering the chamber. Additionally, as also discussed in Section I., there is no motivation to combine the grooves of *Okamoto* with the bores of *Fischer*. As such, *Okamoto*, *Fischer*, and *Collins* cannot be combined with *Shan* in a manner that yields a gas distribution plate having a first side facing a roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 1. Therefore, the Examiner has failed to create a *prima facie* case of obviousness because the combination of the cited references fails to teach or suggest all of the claimed limitations.

Thus, claim 1, and all claims depending therefrom, are patentable over *Shan* in view of *Okamoto*, *Fischer*, and *Collins*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

IV. 35 U.S.C. §103(a) Claims 7, 10-13, 16-19 and 21-26

A. Claims 7, 10-13, 16-17 and 26

Claims 7, 10-13, 16-17 and 26 stand rejected as being unpatentable over *Shan* in view of *Okamoto*, *Fischer*, and *Collins*, and further in view of *Wicker*, and *Wu*. In response, the Applicants have amended claim 1 to more clearly recite aspects of the invention.

As discussed in section III., above, the teachings of *Shan*, *Okamoto*, *Fischer*, and *Collins* cannot be combined in a manner that recites all of the limitations of Claim 1. As discussed in section II. A., above, neither *Wicker* nor *Wu* teaches or suggests a gas distribution plate disposed within a recess in the roof and having a first side facing the roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and

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a plurality of apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 1.

As such, Wicker and Wu cannot be used to modify *Shan*, *Okamoto*, *Fischer*, and *Collins* to teach or suggest a gas distribution plate disposed within a recess in the roof and having a first side facing the roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 1. Therefore, the Examiner has failed to create a *prima facie* case of obviousness because the combination of the cited references fails to teach or suggest all of the claimed limitations.

Thus, independent claim 1, and all claims depending therefrom, are patentable over *Shan* in view of *Okamoto*, *Fischer*, and *Collins*, and further in view of *Wicker* and *Wu*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

B. Claims 18, 19 and 21-25

Claims 18, 19 and 21-25 stand rejected as being unpatentable over *Shan* in view of *Okamoto*, *Fischer*, and *Collins*, and further in view of *Wicker*, and *Wu*. In response, the Applicants have amended claim 18 to more clearly recite aspects of the invention.

Independent claim 18 recites limitations not taught or suggested by any permissible combination of the cited references. Claim 18 recites, in relevant part, a gas distribution plate disposed within a recess in the roof and having a first side facing the roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate. As discussed in section IV. A., above, Wicker and Wu cannot be used to modify *Shan*, *Okamoto*, *Fischer*, and *Collins* to teach or suggest a gas distribution plate disposed within a recess in the roof and having a first side facing the roof and having a plurality of blind radial grooves formed in the first side of the gas distribution

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plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 18. Therefore, the Examiner has failed to create a *prima facie* case of obviousness because the combination of the cited references fails to teach or suggest all of the claimed limitations.

Thus, independent claim 18, and all claims depending therefrom, are patentable over *Shan* in view of *Okamoto*, *Fischer*, and *Collins*, and further in view of *Wicker* and *Wu*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

**V. 35 U.S.C. §103(a) Claims 1, 6, 8 and 9**

Claims 1, 6, 8, and 9 stand rejected as being unpatentable over United States Patent Serial No. 6,171,438, issued January 9, 2001, to Masuda et al. (hereinafter *Masuda*), in view of *Okamoto*, *Fischer*, and *Collins*. In response, the Applicants have amended claim 1 to more clearly recite aspects of the invention.

Claim 1 recites limitations not taught or suggested by any permissible combination the cited references. *Masuda* teaches and suggests a plasma chamber having a housing 114 with a central recess disposed in the bottom surface of the housing 114 and having a gas distribution plate 115 mounted within the central recess. Process gas is delivered from a gas supply means 117 and flows through holes in the gas distribution plate 115. (*Masuda*, Fig. 1, col. 7, ll. 44-56) *Masuda* does not teach a gas distribution plate disposed within a recess in the roof and having a first side facing the roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 1.

*Okamoto*, *Fischer*, and *Collins* are discussed above. For the same reasons as discussed in section I., there is no motivation to incorporate either of the exhaust structures of *Okamoto* or *Fischer* with the gas delivery structure of *Masuda* in a manner that flows incoming process gas through grooves then through holes in the grooves



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before entering the chamber. Additionally, as also discussed in section I., there is no motivation to combine the grooves of *Okamoto* with the bores of *Fischer*. As such, *Okamoto*, *Fischer*, and *Collins* cannot be combined with *Masuda* in a manner that yields a gas distribution plate disposed within a recess in the roof and having a first side facing the roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 1. Therefore, the Examiner has failed to create a *prima facie* case of obviousness because the combination of the cited references fails to teach or suggest all of the claimed limitations.

Thus, claim 1, and all claims depending therefrom, are patentable over *Masuda* in view of *Okamoto*, *Fischer*, and *Collins*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

VI. 35 U.S.C. §103(a) Claims 7, 10-13, 16-19 and 21-26

A. Claims 7, 10-13, 16-17 and 26

Claims 7, 10-13, 16-17 and 26 stand rejected as being unpatentable over *Masuda* in view of *Okamoto*, *Fischer*, and *Collins*, and further in view of *Wicker*, and *Wu*. In response, the Applicants have amended claim 1 to more clearly recite aspects of the invention.

As discussed in section V., above, the teachings of *Masuda*, *Okamoto*, *Fischer*, and *Collins* cannot be combined in a manner that recites all of the limitations of Claim 1. As discussed in section II. A., above, neither *Wicker* nor *Wu* teaches or suggests a gas distribution plate disposed within a recess in the roof and having a first side facing the roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 1.

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As such, Wicker and Wu cannot be used to modify *Masuda*, *Okamoto*, *Fischer*, and *Collins* to teach or suggest a gas distribution plate disposed within a recess in the roof and having a first side facing the roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 1. Therefore, the Examiner has failed to create a *prima facie* case of obviousness because the combination of the cited references fails to teach or suggest all of the claimed limitations.

Thus, independent claim 1, and all claims depending therefrom, are patentable over *Masuda* in view of *Okamoto*, *Fischer*, and *Collins*, and further in view of *Wicker* and *Wu*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

B. Claims 18, 19 and 21-25

Claims 18, 19 and 21-25 stand rejected as being unpatentable over *Masuda* in view of *Okamoto*, *Fischer*, and *Collins*, and further in view of *Wicker*, and *Wu*. In response, the Applicants have amended claim 18 to more clearly recite aspects of the invention.

Independent claim 18 recites limitations not taught or suggested by any permissible combination of the cited references. Claim 18 recites, in relevant part, a gas distribution plate disposed within a recess in the roof and having a first side facing the roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of apertures disposed within the grooves and extending through the gas distribution plate. As discussed in section VI. A., above, Wicker and Wu cannot be used to modify *Masuda*, *Okamoto*, *Fischer*, and *Collins* to teach or suggest a gas distribution plate disposed within a recess in the roof and having a first side facing the roof and having a plurality of blind radial grooves formed in the first side of the gas distribution plate, the grooves being in fluid communication with a center gas feed, and a plurality of

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apertures disposed within the grooves and extending through the gas distribution plate, as recited in claim 18. Therefore, the Examiner has failed to create a *prima facie* case of obviousness because the combination of the cited references fails to teach or suggest all of the claimed limitations.

Thus, independent claim 18, and all claims depending therefrom, are patentable over *Masuda* in view of *Okamoto*, *Fischer*, and *Collins*, and further in view of *Wicker* and *Wu*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

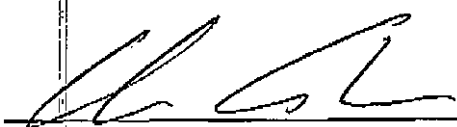
### CONCLUSION

Thus, applicants submit that all of the pending claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that there are any unresolved issues requiring adverse final action in any of the claims now pending in the application, it is requested that the Examiner telephone Keith Taboada at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

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